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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/676,267	10/02/2003	Shinya Sonobe	0055/ 058001	3457
22893	7590	11/03/2004	EXAMINER	
SMITH PATENT OFFICE 1901 PENNSYLVANIA AVENUE N W SUITE 200 WASHINGTON, DC 20006			SOWARD, IDA M	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 11/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/676,267

Applicant(s)

SONOBE, SHINYA

Examiner

Ida M Soward

Art Unit

2822

*ms*

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 07 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 10-2-03.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

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### DETAILED ACTION

This Office Action is in response to the Applicant's preliminary amendment filed June 7, 2004.

#### *Priority*

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

#### *Specification*

The disclosure is objected to because of the following informalities: the label "**Figure 1**" through "**Figure 5**" and "**Figure 7**" through "**Figure 8**" are not prefaced before describing the figures in the detail description of the preferred embodiments.

Appropriate correction is required.

#### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Okazaki (US 2003/0209717 A1).

Okazaki teaches a nitride semiconductor device comprising: at least a p-type nitride semiconductor layer 15; an electrode 16 including at least rhodium and iridium (Figure 1, pages 4-5, paragraphs [0049] and [0061]).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okazaki (US 2003/0209717 A1) as applied to claim 1 above, and further in view of Ikeda et al. (US 6,475,321 B1).

Okazaki teaches all mentioned in the rejection above. However, Okazaki fails to teach the electrode having an at least two-layer structure wherein iridium is laminated on rhodium which is laminated in contact with the p-type nitride semiconductor layer.

Ikeda et al. teach the capability of forming an electrode 102 having an at least two-layer structure including at least iridium and rhodium and laminates of them (Figure 4G, column 5, lines 32-39).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor structure as taught by Okazaki with the

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electrode having the at least two-layer structure as taught by Ikeda et al. for the purpose of providing a highly electroconductive metal (column 5, lines 32-39).

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okazaki (US 2003/0209717 A1) and Ikeda et al. (US 6,475,321 B1) as applied to claims 1-2 above, and further in view of Sano (US 2003/0038294A1).

Okazaki and Ikeda et al. teach all mentioned above. However, Okazaki and Ikeda et al. fail to teach the film thickness of rhodium in the two-layer structure being from equal or greater than 10Å to equal or less than 1000Å.

Sano teach a film thickness of rhodium in a two-layer structure being from 100Å to 10000Å, which falls in the range of equal or greater than 10Å to equal or less than 1000Å (page 4, paragraph [0051]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor structure as taught by Okazaki and the electrode having the at least two-layer structure as taught by Ikeda et al. with the film thickness of rhodium in the two-layer structure being from equal or greater than 10Å to equal or less than 1000Å as taught by Sano to improve the heat resistance (page 2, paragraph [0026]).

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okazaki (US 2003/0209717 A1) as applied to claim 1 above, and further in view of Chen et al. (US 2003/0162342 A1).

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Okazaki teaches all mentioned above. However, Okazaki fails to teach an electrode being annealed at equal or greater than 300°C.

Chen et al. teach an electrode being annealed preferably between about 350°C and about 600°C, and more preferably between about 400°C and about 500°C, which is in the range of equal or greater than 300°C (page 1, paragraph [0012]).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor structure as taught by Okazaki with the electrode being annealed at equal or greater than 300°C as taught by Chen et al. for the purpose of having the capability of manufacturing electrodes in deep sub-micron devices (page 1, paragraphs [0001] and [0012]).

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents are cited to further show the state of the art with respect to semiconductor device containing a rhodium and/or iridium electrode:

Desu et al. (5,807,774)

Okazaki (5,990,500)

Senda et al. (US 2003/0227065 A1)

Takatani (6,100,174).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ida M Soward whose telephone number is 571-272-1845. The examiner can normally be reached on Monday - Thursday, 6:30 am to 5:00 pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

IMS

October 29, 2004

*[Handwritten signature]*  
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